HYDROGEN STUDIES

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HEART - SURGERY/TRANSPLANTATION

Molecular hydrogen exposure improves functional state of red blood cells in the early postoperative ...

Year Published: 2023

Molecular hydrogen (H_2) has been considered a preventive and therapeutic medical gas in numerous diseases. The study aimed to investigate the potential role of molecular hydrogen as a component of anesthesia in surgical treatment with cardiopulmonary bypass (CPB) of acquired valve defects on the functional state of red blood cells (RBC) and functional indicators of cardiac activity. This clinical ...

BRAIN - DIABETES

Hydrogen exerts neuroprotective effects by inhibiting oxidative stress in experimental diabetic ...

Year Published: 2023

Diabetic peripheral neuropathy (DPN) is a complex disorder caused by long-standing diabetes. Oxidative stress was considered the critical creed in this DPN pathophysiology. Hydrogen has antioxidative effects on diabetes mellitus and related complications. However, there is still no concern on the beneficial effects of hydrogen in DPN. This paper aimed to evaluate the effects of exogenous hydrogen ...

KIDNEY - ACUTE KIDNEY INJURY

Inhalation of 4% and 67% hydrogen ameliorates oxidative stress, inflammation, apoptosis, and ...

Year Published: 2023

Acute kidney injury (AKI) is the major complication of rhabdomyolysis (RM) clinically, which is usually mimicked by glycerol injection in basic research. Oxidative stress, inflammatory response and apoptosis are recognized to play important roles in development of this disease. Recently, numerous studies have reported the therapeutic effects of molecular hydrogen (H_2) on oxidative stress and ...

SPINE - INTERVERTEBRAL DISC DEGENERATION (IVDD)

ROS-responsive magnesium-containing microspheres for antioxidative treatment of intervertebral disc ...

Year Published: 2023

Intervertebral disc degeneration (IVDD) is a degenerative disease characterized by lower-back pain, causing disability globally. Antioxidant therapy is currently considered one of the most promising strategies for IVDD treatment, given the crucial role of reactive oxygen species (ROS) in IVDD pathogenesis. Herein, a ROS-responsive magnesium-containing microsphere (Mg@PLPE MS) was constructed for ...

WHOLE BODY - CANCER

Enzyme-Triggered Size-Switchable Nanosystem for Deep Tumor Penetration and Hydrogen Therapy

Year Published: 2023

The poor penetration of nanocarriers within tumor dense extracellular matrices (ECM) greatly restricts the access of anticancer drugs to the deep tumor cells, resulting in low therapeutic efficacy. Moreover, the high toxicity of the traditional chemotherapeutics inevitably causes undesirable side effects. Herein, taking the advantages of biosafe H_2 and small-sized nanoparticles in diffusion within ...

EAR - HEARING LOSS

Taurine, Coenzyme Q10, and Hydrogen Water Prevents Germanium Dioxide-Induced Mitochondrial ...

Year Published: 2023

Mitochondrial dysfunction has been implicated in numerous common diseases as well as aging and plays an important role in the pathogenesis of sensorineural hearing loss (SNHL). In the current study, we showed that supplementation with germanium dioxide (GeO_2) in CBA/J mice resulted in SNHL due to the degeneration of the stria vascularis and spiral ganglion, which were associated with ...

BRAIN - SEPSIS

Molecular hydrogen attenuates sepsis-induced cognitive dysfunction through regulation of tau ...

Year Published: 2023

Background: Sepsis-associated encephalopathy (SAE) is a cognitive dysfunction caused by sepsis. Hyperphosphorylated tau is considered to play a significant role in the progression of neurodegenerative disease and also contributes to cognitive dysfunction in septic mice. Molecular hydrogen (H_2) plays an antioxidant and anti-inflammatory role, and plays a protective role in septic mice. This study ...

BRAIN - ALZHEIMER'S DISEASE (AD)

Hydrogen-rich water ameliorates neuropathological impairments in a mouse model of Alzheimer's ...

Year Published: 2022

Hydrogen exhibits the potential to treat Alzheimer's disease. Stereotactic injection has been previously used as an invasive method of administering active hydrogen, but this method has limitations in clinical practice. In this study, triple transgenic (3×Tg) Alzheimer's disease mice were treated with hydrogen-rich water for 7 months. The results showed that hydrogen-rich water prevented synaptic ...

INTESTINE - INFLAMMATORY BOWEL DISEASE (IBD)

Microbial hydrogen economy alleviates colitis by reprogramming colonocyte metabolism and reinforcing ...

Year Published: 2022

With the rapid development and high therapeutic efficiency and biosafety of gas-involving theranostics, hydrogen medicine has been particularly outstanding because hydrogen gas (H_2), a microbial-derived gas, has potent anti-oxidative, anti-apoptotic, and anti-inflammatory activities in many disease models. Studies have suggested that H_2-enriched saline/water alleviates colitis in murine models; ...

BRAIN - STROKE

Gender-based differences in neuroprotective effects of hydrogen gas against intracerebral ...

Year Published: 2022

Background: Post-stroke depression (PSD) severely affects recovery in patients with intracerebral hemorrhage (ICH). Although hydrogen gas (H_2) exerts excellent neuroprotective effects in patients with ICH, there are sex-based differences in H_2 efficacy in several diseases. Herein, we determined whether estrogen increases susceptibility to the neuroprotective effects of H_2 in males with ICH-induced ...

BRAIN - TRAUMATIC BRAIN INJURY

Hydrogen-rich saline alleviates early brain injury through inhibition of necroptosis and ...

Year Published: 2022

Traumatic brain injury (TBI) has been recognized as a serious public health issue and a key contributor to disability and death, with a huge economic burden worldwide. Hydrogen, which is a slight and specific cytotoxic oxygen radical scavenger, has been demonstrated to ameliorate early brain injury (EBI) through reactive oxygen species (ROS), oxidative stress injury, apoptosis and necroptosis. ...

INTESTINE - CANCER

Hydrogen-rich water exerts anti-tumor effects comparable to 5-fluorouracil in a colorectal cancer ...

Year Published: 2022

Background: Colorectal cancer (CRC) is the third leading cause of cancer-related deaths in the world. Tumor removal remains the preferred frontline treatment; however, effective non-surgical interventions remain a high priority. 5-fluorouracil (5-FU) is a widely used chemotherapy agent, and molecular hydrogen (H_2) has been recognized for its antioxidant and anti-inflammatory effects, with research ...

LUNG - SEPSIS

Hydrogen-rich and hyperoxygenate saline inhibits lipopolysaccharide-induced lung injury through ...

Year Published: 2022

Background: Acute lung injury (ALI) is one kind of frequently occurred emergency in Intensive Care Unite with a high mortality. The underlying causes are uncontrolled inflammatory reactions and intractable hypoxemia, which are difficult to control and improve. In the past 10 years, gas medical studies have found that both hydrogen molecules and oxygen molecules have protective effects ...

WHOLE BODY - CANCER

Molecular Hydrogen Enhances Proliferation of Cancer Cells That Exhibit Potent Mitochondrial Unfolded ...

Year Published: 2022

Molecular hydrogen ameliorates pathological states in a variety of human diseases, animal models, and cell models, but the effects of hydrogen on cancer have been rarely reported. In addition, the molecular mechanisms underlying the effects of hydrogen remain mostly unelucidated. We found that hydrogen enhances proliferation of four out of seven human cancer cell lines (the responders). The ...

WHOLE BODY - EXCERCISE

Molecular Hydrogen Mitigates Performance Decrement during Repeated Sprints in Professional Soccer ...

Year Published: 2022

Hydrogen-rich water (HRW) supplementation has been shown to have an antifatigue effect across different modes of exercise. However, its effect on repeated sprint performance is unknown. The aim of this study was to assess the effect of pre-exercise HRW consumption on repeated sprint performance, lactate, and perceptual responses using a repeated sprint protocol. This randomized, double blinded, ...

WHOLE BODY - HYPERTENSION

Effects of hydrogen-rich water and ascorbic acid treatment on spontaneously hypertensive rats

Year Published: 2022

Hydrogen-rich water (HW) has been suggested to possess antioxidant properties of value in treatments of lifestyle diseases and for prevention of latent pathologies. To date, the potential benefits of HW against the deleterious effects of excessive salt intake and hypertension have not been investigated. Here, we first examined the effects of HW or HW supplemented with 0.1% ascorbic acid (HWA) on ...

WHOLE BODY - SARS/COVID

Hydrogen-oxygen therapy alleviates clinical symptoms in twelve patients hospitalized with COVID-19: ...

Year Published: 2022

A global public health crisis caused by the 2019 novel coronavirus disease (COVID-19) leads to considerable morbidity and mortality, which bring great challenge to respiratory medicine. Hydrogen-oxygen therapy contributes to treat severe respiratory diseases and improve lung functions, yet there is no information to support the clinical use of this therapy in the COVID-19 pneumonia.A retrospective ...

WHOLE BODY - VIRAL INFECTION

Nano-bubble hydrogen water: An effective therapeutic agent against inflammation related disease ...

Year Published: 2022

Since the anti-inflammatory effect of hydrogen has been widely known, it was supposed that hydrogen could suppress tissue damage by inhibiting virus-related inflammatory reactions. However, hydrogen is slightly soluble in water, which leads to poor effect of oral hydrogen-rich water therapy. In this study, the nano-bubble hydrogen water (nano-HW) (about 0.7 ppm) was prepared and its therapeutic ...

BRAIN - COMA

Hydrogen inhalation promotes recovery of a patient in persistent vegetative state from intracerebral ...

Year Published: 2022

Background: Persistent vegetative state (PVS) is a devastating and long-lasting clinical condition with high morbidity and mortality; currently, there are no available effective interventions. Case summary: We report the case of an 11-year-old boy with PVS caused by severe intracerebral bleeding in the left hemisphere following anticoagulation treatment. The patient's PVS severity showed no ...

LUNG - SARS/COVID

Molecular Hydrogen Positively Affects Physical and Respiratory Function in Acute Post-COVID-19 ...

Year Published: 2022

Molecular hydrogen (H_2) is potentially a novel therapeutic gas for acute post-coronavirus disease 2019 (COVID-19) patients because it has antioxidative, anti-inflammatory, anti-apoptosis, and antifatigue properties. The aim of this study was to determine the effect of 14 days of H_2 inhalation on the respiratory and physical fitness status of acute post-COVID-19 patients. This randomized, ...

WHOLE BODY - SEPSIS

H_2 Inhibits the Formation of Neutrophil Extracellular Traps

Year Published: 2022

Neutrophil extracellular traps (NETs) contribute to inflammatory pathogenesis in numerous conditions, including infectious and cardiovascular diseases, and have attracted attention as potential therapeutic targets. H_2 acts as an antioxidant and has been clinically and experimentally proven to ameliorate inflammation. This study was performed to investigate whether H_2 could inhibit NET formation ...

LIVER - IMMUNE REGULATION

Long-term and daily use of molecular hydrogen induces reprogramming of liver metabolism in rats by ...

Year Published: 2022

Molecular hydrogen (H_2) has emerged as a new therapeutic option in several diseases and is widely adopted by healthy people. However, molecular data to support therapeutic functions attributed to the biological activities of H_2 remain elusive. Here, using transcriptomic and metabolomic approaches coupled with biochemistry and micro-CT technics, we evaluated the effect of long-term (6 months) and ...

SKIN - SURGERY/TRANSPLANTATION

Hydrogen-generating Si-based agent protects against skin flap ischemia-reperfusion injury in rats

Year Published: 2022

Hydrogen is effective against ischemia-reperfusion (I/R) injury in skin flaps. However, the difficulty of continuously administering a sufficient amount of hydrogen using conventional methods has been an issue in the clinical application of hydrogen-based therapy. An Si-based agent administered orally was previously shown to continuously generate a large amount of hydrogen in the intestinal ...

WHOLE BODY - DIABETES

The improvement of insulin level after hydrogen-rich water therapy in streptozotocin-induced ...

Year Published: 2022

Background and aim: Water plays a pivotal role in the body. Alteration of the fluid balance promotes metabolic disorder, thus leading to the development of various diseases, such as diabetes mellitus (DM). Hydrogen-rich water (HW) is recognized as a novel antioxidant. This study aimed to investigate the role of HW on insulin, insulin receptor (IRs), and superoxide dismutase (SOD) levels in ...

HEART - CARDIAC HYPERTROPHY

Hydrogen Attenuates Thyroid Hormone-Induced Cardiac Hypertrophy in Rats by regulating angiotensin II ...

Year Published: 2022

Cardiac hypertrophy occurs as a result of high levels of thyroid hormone, which may contribute to heart failure and is closely related to oxidative stress. Hydrogen is a good antioxidant. In this study, we found that intragastric levothyroxine administration for two weeks caused obvious cardiac hypertrophy without reduced systolic function. Additionally, hydrogen inhalation ameliorated the ...

BRAIN - SEPSIS

PPARα contributes to the therapeutic effect of hydrogen gas against sepsis-associated ...

Year Published: 2022

Sepsis-associated encephalopathy (SAE), a fatal complication of sepsis, contributes to cognitive impairment, high morbidity, and mortality. The molecular mechanism of hydrogen (H_2) administration, as a promising strategy for the treatment of SAE, is still unclear. Peroxisome proliferator-activated receptor α (PPARα) is essential for alleviating symptoms and complications of SAE. However, little ...

INTESTINE - SURGERY/TRANSPLANTATION

Protective Effects of Hydrogen-Rich Saline on Experimental Intestinal Volvulus in Rats

Year Published: 2022

Background: Intestinal volvulus can cause morbidity and mortality. Surgical reduction, on the other hand, could result in ischemia-reperfusion (I/R) injury. Hydrogen rich saline solution (HRSS neutralizes free radicals in the body. This study aimed to investigate the effects of HRSS in I/R injury in experimental intestinal volvulus in rats. Methods: Thirty rats were randomly allocated into 5 ...

BRAIN - CARDIAC ARREST

FDG-PET/CT Assessment of the Cerebral Protective Effects of Hydrogen in Rabbits with Cardiac Arrest

Year Published: 2022

Background: Anatomical imaging methods and histological examinations have limited clinical value for early monitoring of brain function damage after cardiac arrest (CA) in vivo. Objective: We aimed to assess the cerebral protective effects of hydrogen in rabbits with CA by using fluorodeoxyglucose-positron emission tomography/computed tomography (FDG-PET/CT). Methods: Male rabbits were divided ...

SKIN - WOUND HEALING

Local Treatment of Hydrogen-Rich Saline Promotes Wound Healing In Vivo by Inhibiting Oxidative ...

Year Published: 2022

Wound healing is a complex dynamic process involving a large number of biological events. Excessive oxidative stress is a key factor delaying wound healing. Hydrogen is an antioxidant, anti-inflammatory, and antiapoptotic medical gas with safety, effectiveness, and penetrability. However, the effects of local treatment of hydrogen on wound healing and its potential mechanisms remain unclear. In ...

HEART - DIABETES

Co-administration of hydrogen and metformin exerts cardioprotective effects by inhibiting pyroptosis ...

Year Published: 2022

Hydrogen is a novel medical gas with several properties, including anti-oxidative, anti-inflammatory, anti-apoptotic, anti-allergic, and energy metabolism stimulating properties. Hydrogen therapy has been proven effective in the treatment of myocardial infarction, myocardial ischemia, and ischemia-reperfusion injury. Diabetic cardiomyopathy (DCM) is a serious cardiovascular complication of ...

KIDNEY - ACUTE KIDNEY INJURY

Development of a novel porcine ischemia/reperfusion model inducing different ischemia times in ...

Year Published: 2022

Background: Acute kidney injury and its central pathology, renal ischemia reperfusion injury (IRI), have been studied in many animal models. Although renal IRI has been induced in pig models in many ways, simultaneous bilateral ischemia or unilateral ischemia along with contralateral nephrectomy models only provide data on the renal response to a single ischemia time. Moreover, it has been ...

WHOLE BODY - EXCERCISE

Short-Term Consumption of Hydrogen-Rich Water Enhances Power Performance and Heart Rate Recovery in ...

Year Published: 2022

(1) Background: Exercise that exceeds the body's accustomed load can lead to oxidative stress and increased fatigue during intense training or competition, resulting in decreased athletic performance and an increased risk of injury, and the new medicinal H_2 may be beneficial as an antioxidant. Therefore, we explored the effect of short-term supplementation of hydrogen-rich water (HRW) on the work ...

LUNG - SEPSIS

Magnesium Hydride Ameliorates Endotoxin-Induced Acute Respiratory Distress Syndrome by Inhibiting ...

Year Published: 2022

Acute respiratory distress syndrome (ARDS) causes uncontrolled pulmonary inflammation, resulting in high morbidity and mortality in severe cases. Given the antioxidative effect of molecular hydrogen, some recent studies suggest the potential use of molecular hydrogen as a biomedicine for the treatment of ARDS. In this study, we aimed to explore the protective effects of magnesium hydride (MgH_2) on ...

INTESTINE - CANCER

Molecular Hydrogen Inhibits Colorectal Cancer Growth via the AKT/SCD1 Signaling Pathway

Year Published: 2022

Objective: Molecular hydrogen (H_2) has been considered a potential therapeutic target in many cancers. Therefore, we sought to assess the potential effect of H_2 on colorectal cancer (CRC) in this study. Methods: The effect of H_2 on the proliferation and apoptosis of RKO, SW480, and HCT116 CRC cell lines was assayed by CCK-8, colony formation, and flow cytometry assays. The effect of H_2 on tumor ...

INTESTINE - HYDROGEN BIOLOGY

Different effects of hydrogen-rich water intake and hydrogen gas inhalation on gut microbiome and ...

Year Published: 2022

The potential for preventive and therapeutic applications of H_2 have now been confirmed in various disease. However, the effects of H_2 on health status have not been fully elucidated. Our previous study reported changes in the body weight and 13 serum biochemical parameters during the six study reported changes in the body weight and 13 serum biochemical parameters during the six-month hydrogen intervention. To obtain a more comprehensive understanding of the effects of long-term hydrogen ...

PREGNANCY - NEUROPROTECTION

Social Communication of Maternal Immune Activation-Affected Offspring Is Improved by Si-Based ...

Year Published: 2022

Maternal immune activation (MIA) is triggered by infection or autoimmune predisposition during pregnancy, and cytokines produced by MIA are transmitted through the placenta to the fetal brain, implicating at the onset risks and vulnerability for developmental and psychiatric disorders, such as autism spectrum disorder (ASD) and schizophrenia. To address these kinds of problem in child health, we ...

HEART - CARDIAC ARREST

Hydrogen therapy after resuscitation improves myocardial injury involving inhibition of autophagy in ...

Year Published: 2022

Hydrogen (H2) therapy is a therapeutic strategy using molecular H2. Due to its ability to regulate cell homeostasis, H2 therapy has exhibited marked therapeutic effects on a number of oxidative stress-associated diseases. The present study investigated the effectiveness of H2 therapy in protecting against myocardial injury in a rat model of asphyxial cardiac arrest and cardiopulmonary ...

WHOLE BODY - CANCER

Magnesium galvanic cells produce hydrogen and modulate the tumor microenvironment to inhibit cancer ...

Year Published: 2022

Hydrogen can be used as an anti-cancer treatment. However, the continuous generation of H2 molecules within the tumor is challenging. Magnesium (Mg) and its alloys have been extensively used in the clinic as implantable metals. Here we develop, by decorating platinum on the surface of Mg rods, a Mg-based galvanic cell (MgG), which allows the continuous generation of H2 in an aqueous environment ...

EAR - CANCER

Effect of Hydrogen Inhalation Therapy on Hearing Loss of Patients With Nasopharyngeal Carcinoma ...

Year Published: 2022

Objective: To evaluate the clinical efficacy and safety of hydrogen inhalation in improving hearing loss in patients with long-term survival of nasopharyngeal carcinoma after radiotherapy. Methods: The eustachian tube dysfunction score, pure tone air conduction threshold, bone conduction threshold, the score of tympanogram and otoscope were prospectively observed in patients with deafness after ...

INTESTINE - INFLAMMATORY BOWEL DISEASE (IBD)

A new therapy against ulcerative colitis via the intestine and brain using the Si-based agent

Year Published: 2022

Ulcerative colitis (UC) is a non-specific inflammatory bowel disease that causes ulcers and erosions in the colonic mucosa and becomes chronic with cycles of amelioration and exacerbation. Because its exact etiology remains largely unclear, and the primary therapy is limited to symptomatic treatment, the development of new therapeutic agent for UC is highly desired. Because one of the disease ...

LUNG - SEPSIS

Hydrogen Repairs LPS-Induced Endothelial Progenitor Cells Injury via PI3K/AKT/eNOS Pathway

Year Published: 2022

Endotoxins and other harmful substances may cause an increase in permeability in endothelial cells (ECs) monolayers, as well as ECs shrinkage and death to induce lung damage. Lipopolysaccharide (LPS) can impair endothelial progenitor cells (EPCs) functions, including proliferation, migration, and tube formation. EPCs can migrate to the damaged area, differentiate into ECs, and participate in ...

HEART - VASCULITIS

Hydrogen Gas Inhalation Regressed Coronary Artery Aneurysm in Kawasaki Disease-Case Report and ...

Year Published: 2022

Kawasaki disease (KD) is a systemic vasculitis that primarily affects children under the age of 5 years old and is among the most common acquired heart disease in developed countries, particularly in Asia. No effective treatment is currently available for aneurysm formation in KD. In this report, we showed a KD patient with an aneurysm over the right coronary artery with a size of 6.08 mm in ...

BONE - RHEUMATOID ARTHRITIS (RA)

Retracted: Hydrogen alleviates collagen-induced arthritis (CIA) in mice by inhibiting IL-22 levels

Year Published: 2022

Objective To investigate the therapeutic effect and mechanism of hydrogen (H2) on collagen-induced arthritis (CIA) in mice. Methods DBA/1 mice were randomly divided into normal control group, CIA group and CIA mice treated with H2 group (H2 treated group), with 6 mice in each group. Following the preparation of CIA mouse model, the H2 treated group received H2 inhalation therapy (300 mL/L, 3 ...

BRAIN - ANXIETY

Effects of hydrogen water and psychological treatment in a sample of women with panic disorder: a ...

Year Published: 2022

Research suggests that inflammation is an important mediator in the pathophysiology of anxiety disorders. In addition, women are more likely to develop an anxiety and depression disorder, in comorbidity with a wide spectrum of diseases related to the immune system. In recent years, hydrogen-rich water has emerged as a promising therapeutic strategy to prevent and intervene in stress-related ...

LIVER - LIVER DISEASE

A randomized, placebo-controlled clinical trial of hydrogen/oxygen inhalation for non-alcoholic ...

Year Published: 2022

Non-alcoholic fatty liver disease (NAFLD) is the most common chronic liver disease worldwide with increasing incidence consistent with obesity, type 2 diabetes and cardiovascular diseases. No approved medication was currently available for NAFLD treatment. Molecular hydrogen (H2), an anti-oxidative, anti-inflammatory biomedical agent is proved to exhibit therapeutic and preventive effect in ...

WHOLE BODY - SEPSIS

Hydrogen-rich medium ameliorates lipopolysaccharides-induced mitochondrial fission and dysfunction ...

Year Published: 2022

Background: Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. It has been showed that the change of mitochondrial dynamics has been proved to be one of the main causes of death in patients with severe sepsis. And hydrogen has been proved to exert its protective effects against sepsis via heme oxygenase-1 (HO-1). This study was designed to ...

BREAST - MASTITIS

Hydrogen helps to ameliorate Staphylococcus aureus-induced mastitis in mice

Year Published: 2022

Many studies have shown that hydrogen has anti-inflammatory and anti-oxidant effects. Because of its ability to quickly pass through cell membranes, hydrogen has become a hot spot in the research of inflammatory diseases. Vitamin E glycerin (VEG) and hydrogen-rich Vitamin E glycerin (HR-VEG) were prepared, aiming to explore their anti-inflammatory activities in mice mastitis induced by ...

EYE - RETINAL INJURY

Drinking hydrogen water improves photoreceptor structure and function in retinal degeneration 6 mice

Year Published: 2022

Retinitis pigmentosa (RP) is a genetically heterogeneous group of inherited retinal disorders involving the progressive dysfunction of photoreceptors and the retinal pigment epithelium, for which there is currently no treatment. The rd6 mouse is a natural model of autosomal recessive retinal degeneration. Given the known contributions of oxidative stress caused by reactive oxygen species (ROS) and ...

EAR - ENVIRONMENTAL POLLUTION

Hydrogen Gas Inhalation Attenuates Acute Impulse Noise Trauma: A Preclinical In Vivo Study

Year Published: 2022

Objective: Molecular hydrogen (H2) has shown therapeutic potential in several oxidative stress-related conditions in humans, is well-tolerated, and is easily administered via inhalation.The aim of this preclinical in vivo study was to investigate whether impulse noise trauma can be prevented by H2 when inhaled immediately after impulse noise exposure. Methods: Guinea pigs (n = 26) were subjected ...

NOSE - RHINITIS

The Beneficial Effects of Hydrogen-Rich Saline Irrigation on Chronic Rhinitis: A Randomized, ...

Year Published: 2022

Purpose: Chronic rhinitis (CR) is a common chronic inflammation of the nasal mucosa. Nasal saline irrigation has been demonstrated to be an effective treatment for CR. In this study, we investigated the beneficial effects of hydrogen-rich saline irrigation as an anti-inflammatory irrigation therapy for CR and compared its effectiveness over saline irrigation. Hydrogen-rich saline (HRS) was ...

BRAIN - DIABETES

Molecular Hydrogen Mediates Neurorestorative Effects After Stroke in Diabetic Rats: the TLR4/NF-κB ...

Year Published: 2022

Diabetes is an independent risk factor for stroke and amplifies inflammation. Diabetic stroke is associated with a higher risk of death and worse neural function. The identification of effective anti-inflammatory molecules with translational advantages is particularly important to promote perioperative neurorestorative effects. Applying molecular hydrogen, we measured blood glucose levels before ...

WHOLE BODY - SARS/COVID

Hydrogen-rich water alleviates inflammation and fatigue in COVID-19: A pilot study

Year Published: 2022

No abstract available

LUNG - SARS/COVID

Abstract: Effect of hydrogen therapy on the proteomic profile of exhaled breath condensate after ...

Year Published: 2022

Exhaled breath condensate (EBC) is a promising object for biomarkers search as it contains compounds reflecting changes of biological processes caused by various respiratory diseases including COVID-19. Molecular hydrogen was recently discovered as a new effective antioxidant that can restore lung function after COVID-19. The effect of molecular hydrogen on lung function was studied by comparing ...

WHOLE BODY - ROS-SCAVENGING

Enhanced Removal of Free Radicals by Aqueous Hydrogen Nanobubbles and Their Role in Oxidative Stress ...

Year Published: 2022

Elevated levels of reactive oxygen radicals caused by environmental stress are the key triggers of inflammation, aging, and disease; thus, it is critical to develop novel reactive oxygen radical scavenging methods with high efficiency and low toxicity. As a result of their selective reactive oxygen radical removal, hydrogen molecules are strong candidates, but their application is limited by the ...

EYE - CORNEAL INJURY

Prophylactic Instillation of Hydrogen-Rich Water Decreases Corneal Inflammation and Promotes Wound ...

Year Published: 2022

Many studies have demonstrated the therapeutic effects of hydrogen in pathological conditions such as inflammation; however, little is known about its prophylactic effects. The purpose of this study is to investigate the prophylactic effects of hydrogen-rich water instillation in a rat corneal alkali burn model. Hydrogen-rich water (hydrogen group) or physiological saline (vehicle group) was ...

WHOLE BODY - HYDROGEN BIOLOGY

Synergistic Effect of Hydrogen and 5-Aza on Myogenic Differentiation through the p38 MAPK Signaling ...

Year Published: 2022

Background and objectives: This study aims to clarify the systems underlying regulation and regulatory roles of hydrogen combined with 5-Aza in the myogenic differentiation of adipose mesenchymal stem cells (ADSCs). Methods and results: In this study, ADSCs acted as an in vitro myogenic differentiating mode. First, the Alamar blue Staining and mitochondrial tracer technique were used to verify ...

WHOLE BODY - ROS-SCAVENGING

Antioxidation activity of molecular hydrogen via protoheme catalysis in vivo: an insight from ab ...

Year Published: 2022

Recently, molecular hydrogen has been found to exhibit antioxidation activity through many clinical experiments, but the mechanism has not been fully understandable at atomic level. In this work, we perform systematic ab initio calculations of protoheme-hydrogen complexes to clarify the antioxidation mechanism of molecular hydrogen. We make molecular modeling of iron-protoporphyrin coordinated by ...

WHOLE BODY - EXCERCISE

The Acute Effects of a Single Dose of Molecular Hydrogen Supplements on Responses to Ergogenic ...

Year Published: 2022

This research examined the effects of single-dose molecular hydrogen (H2) supplements on acid-base status and local muscle deoxygenation during rest, high-intensity intermittent training (HIIT) performance, and recovery. Ten healthy, trained subjects in a randomized, double-blind, crossover design received H2-rich calcium powder (HCP) (1500 mg, containing 2.544 µg of H2) or H2-depleted placebo ...

HEART - HEART FAILURE

Dynamics of Metabolic and Oxidative Parameters of Erythrocytes during Treatment of Chronic Heart ...

Year Published: 2022

We studied the effect of molecular hydrogen (H2) on the content of 2,3-diphosphoglyceric acid (2,3-DPG), ATP, malondialdehyde, and catalase activity in erythrocytes in chronic heart failure. Inhalation of 2% molecular hydrogen H2 was carried out for 40 min repeatedly (5 days) or once. Inhalation of H2 caused an increase in ATP concentration in both research groups, but was more pronounced after ...

TESTES - INFERTILITY

Molecular Hydrogen Reduces Electromagnetic Pulse-Induced Male Rat Reproductive System Damage in a ...

Year Published: 2022

Infertility has got to be a broadly concerned social issue these days, in which the malefactor cannot be overlooked. Numerous studies have shown that electromagnetic pulse (EMP) radiation may have seriously damaging effects on reproductive health, through nonthermal effects and oxidative stress. Molecular hydrogen, a selective hydroxyl radical scavenger, explains the protective effects against ...

WHOLE BODY - HYDROGEN BIOLOGY

Accurate in vivo real-time determination of the hydrogen concentration in different tissues of mice ...

Year Published: 2022

As an antioxidant, anti-inflammatory and anti-apoptotic agent, hydrogen (H2) shows a promising potential in basic and clinical research against various diseases owing to its safety and efficacy. However, knowledge involving its underlying mechanisms of action, dosage effects, and dose duration remains limited. Previously, the dynamics of H2 concentrations in different tissues of rats after ...

LUNG - CANCER

Hydrogen gas promotes apoptosis of lung adenocarcinoma A549 cells through X-linked inhibitor of ...

Year Published: 2022

Objective: Lung cancer is currently the cancer with the highest incidence and death toll worldwide. Hydrogen gas has been found to affect a variety of diseases; however, the effect of hydrogen gas on patients with lung cancer has not been reported. Therefore, we determined the effect of hydrogen gas on apoptosis of lung adenocarcinoma in vivo and in vitro. Materials and methods: A549 cells in the ...

SKIN - RADIOPROTECTION

Effect of hydrogen intervention on refractory wounds after radiotherapy: A case report

Year Published: 2022

Background: Patients with keloids who receive radiotherapy (RT) after surgery can develop refractory wounds that cannot be healed by the patient's own repair system. Such chronic wounds are uneven and complex due to persistent abscess and ulceration. Without external intervention, they can easily result in local tissue necrosis or, in severe cases, large area tissue resection, amputation, and even ...

WHOLE BODY - HYDROGEN BIOLOGY

Molecular Hydrogen Promotes Adipose-derived Stem Cell Myogenic Differentiation via Regulation of ...

Year Published: 2022

Background: Acute skeletal muscle injuries are common physical or sports traumas. Cellular therapy has excellent potential for regeneration after skeletal muscle injury. Adipose-derived stem cells (ADSCs) are a more accessible type of stem cell. However, it has a low survival rate and differentiation efficiency in the oxidative stress-rich microenvironment after transplantation. Although molecular ...

PREGNANCY - IMMUNE REGULATION

Molecular hydrogen has a positive impact on pregnancy maintenance through enhancement of ...

Year Published: 2022

Aims: Molecular hydrogen (H2) has attracted growing interest because of its implications in various diseases. However, the molecular mechanisms underlying the remarkable effect of a small amount of H2 remain elusive. No knowledge has been available on the role of H2 in the etiology of pregnancy disorders or its direct influence on human immune cells. Since maternal immunity, T cells in particular, ...

BONE - WOUND HEALING

Hydrogen saline water accelerates fracture healing by suppressing autophagy in ovariectomized rats

Year Published: 2022

Objective: The treatment of osteoporotic fractures is difficult, and to minimize the negative result or poor functional rehabilitation, this study focuses on hydrogen water (HRW) to test its effect on the process of menopausal osteoporotic fracture healing and its relationship with autophagy and to try to reveal the potential mechanism of action of HRW on osteoporotic fractures. Materials and ...

WHOLE BODY - ALCOHOLIC HANGOVER

Hydrogen Intake Relieves Alcohol Consumption and Hangover Symptoms in Healthy Adults: a Randomized ...

Year Published: 2022

Background: Alcohol-induced hangover represents a significant, yet understudied, global hazard and a large socio-economic burden. Objectives: The aim of this study was to investigate the effects of hydrogen (H2) on relieving drinking and hangover symptoms in 20 healthy volunteers. Methods: In this pilot, randomized, double-blinded, placebo-controlled, matched, crossover interventional trial, ...

BRAIN - NEUROPATHIC PAIN

Hydrogen-Rich Water as a Novel Therapeutic Strategy for the Affective Disorders Linked with Chronic ...

Year Published: 2022

Neuropathic pain manifested with allodynia and hyperalgesia usually becomes a chronic condition accompanied with mood disorders. Clinical therapies for neuropathic pain are still unsatisfactory with notable side effects. Recent studies have reported the protective role of molecular hydrogen (H2) in different diseases including neurological disorders, such as Alzheimer's as well as its ...

BRAIN - NEUROPATHIC PAIN

Treatment with Hydrogen-Rich Water Improves the Nociceptive and Anxio-Depressive-like Behaviors ...

Year Published: 2022

Chronic inflammatory pain is manifested in many diseases. The potential use of molecular hydrogen (H2) as a new therapy for neurological disorders has been demonstrated. Recent studies prove its analgesic properties in animals with neuropathic pain, but the possible antinociceptive, antidepressant, and/or anxiolytic actions of H2 during persistent inflammatory pain have not been investigated. ...

SKIN - COSMETIC ISSUES

Efficacy of Hydrogen Purification and Cosmetic Acids in the Treatment of Acne Vulgaris: A ...

Year Published: 2022

Acne and skin lesions that appear in its course deteriorate the quality of life of patients, cause depression and the emergence of suicidal thoughts. Cosmetic treatments can have a positive effect on improving skin condition by cleaning up skin eruptions, thus improving the well-being of affected people. Hydrogen purification is a treatment that uses alkaline water generated by a device, which ...

INTESTINE - INFLAMMATORY BOWEL DISEASE (IBD)

Electrolyzed Hydrogen Water Alleviates Abdominal Pain through Suppression of Colonic Tissue ...

Year Published: 2022

Inflammatory bowel disease (IBD) is characterized by chronic inflammation of the digestive tract and is typically accompanied by characteristic symptoms, such as abdominal pain, diarrhea, and bloody stool, severely deteriorating the quality of the patient's life. Electrolyzed hydrogen water (EHW) has been shown to alleviate inflammation in several diseases, such as renal disease and ...

BRAIN - CARDIAC ARREST

Influence of oxygen concentration on the neuroprotective effect of hydrogen inhalation in a rat ...

Year Published: 2022

Background: Post-cardiac arrest (CA) brain injury is the main cause of death in patients resuscitated from CA. Previous studies demonstrated that hydrogen inhalation mitigates post-CA brain injury. However, factors affecting the efficacy of hydrogen remain unknown. In the present study, we investigated the influence of oxygen concentration and targeted temperature on neuroprotective effect in a CA ...

LUNG - SEPSIS

Hydrogen gas alleviates lipopolysaccharide-induced acute lung injury and inflammatory response in ...

Year Published: 2022

Background: Chronic inflammation and oxidant/antioxidant imbalance are two main pathological features associated with lipopolysaccharide (LPS)-induced acute lung injury (ALI). The following study investigated the protective role of hydrogen (H2), a gaseous molecule without known toxicity, in LPS-induced lung injury in mice and explored its potential molecular mechanisms. Methods: Mice were ...

HEART - AGING

The effect of a low dose hydrogen-oxygen mixture inhalation in midlife/older adults with ...

Year Published: 2022

Objective: To explore the effect of a low-dose hydrogen-oxygen (H2-O2) mixture inhalation in midlife/older adults with hypertension. Methods: This randomized, placebo-controlled trial included 60 participants with hypertension aged 50-70 years who were randomly divided into Air group (inhaled placebo air) or H2-O2 group [inhaled H2-O2 mixture (66% H2/33% O2)]. Participants in both groups were ...

WHOLE BODY - SARS/COVID

Hydrogen effect on the mechanisms of mucosal immunity in patients with COVID-19

Year Published: 2022

Aim: To study the inhalation of an active form of hydrogen effect to mucosal and system immunity in a rehabilitation program for health workers. Materials and methods: The study involved patients that survived COVID-19 after therapy with inhaled hydrogen for 90 minutes (n=30), and a control group of patients treated according to standard protocol for managing patients that survived COVID-19 during ...

BONE - RHEUMATOID ARTHRITIS (RA)

NIR-photocatalytic regulation of arthritic synovial microenvironment

Year Published: 2022

Synovial microenvironment (SME) plays a vital role in the formation of synovial pannus and the induction of cartilage destruction in arthritis. In this work, a concept of the photocatalytic regulation of SME is proposed for arthritis treatment, and monodispersive hydrogen-doped titanium dioxide nanorods with a rutile single-crystal structure are developed by a full-solution method to achieve near ...

PREGNANCY - PREECLAMPSIA

Hydrogen suppresses oxidative stress by inhibiting the p38 MAPK signaling pathway in preeclampsia

Year Published: 2022

Background: Hypertensive disorders complicating pregnancy (HDCP) are one of the most serious medical disorders during pregnancy. Objectives: To investigate the effects of hydrogen on the mitogen-activated protein kinase (MAPK) signaling pathway in preeclampsia (PE). Material and methods: The N(omega)-nitro-L-arginine methyl ester (L-NAME)-induced PE model with Sprague Dawley (SD) rats was ...

WHOLE BODY - HYDROGEN BIOLOGY

Silicon nanoparticles for oral administration of molecular hydrogen

Year Published: 2022

Medical use of hydrogen gas (H2) has been given increasing attention over the past 15 years with numerous clinical trials for a variety of indications. The biological activity of H2 includes antioxidant properties and thereby the ability to neutralize damaging reactive oxygen species (ROS). Administration of hydrogen as a medical gas is limited by the poor water solubility and by the flammability ...

INTESTINE - SEPSIS

Hydrogen-Rich Water Mitigates LPS-Induced Chronic Intestinal Inflammatory Response in Rats via Nrf-2 ...

Year Published: 2022

Long-term exposure to low-dose lipopolysaccharide can impair intestinal barriers, causing intestinal inflammation and leading to systemic inflammation. Hydrogen-rich water possesses antioxidant and anti-inflammatory functions and exerts inhibitory effects on various inflammatory diseases. In this study, we investigated whether oral hydrogen-rich water could prevent lipopolysaccharide-induced ...

INTESTINE - ENTEROPATHY

Ameliorating Role of Hydrogen-Rich Water Against NSAID-Induced Enteropathy via Reduction of ROS and ...

Year Published: 2022

Background: Nonsteroidal anti-inflammatory drug (NSAID)-induced enteropathy, the mechanism of which is involved in oxidative stress, can be lethal due to hemorrhage. Thus, we aimed to investigate the effect of hydrogen-rich water (HRW), in terms of oxidative stress, on intestinal mucosal damage as well as changes in the gut microbiome and the short-chain fatty acids (SCFAs) content in feces. ...

EAR - HEARING LOSS

A double-blinded, randomized controlled clinical trial of hydrogen inhalation therapy for idiopathic ...

Year Published: 2022

Background: Hydrogen (H2) has been reported to be effective in reducing hearing loss due to several causes in animal studies. However, no study has examined the effectiveness of H2 in treating hearing loss in humans. Thus, we investigated whether H2 is effective for the treatment of idiopathic sudden sensorineural hearing loss (ISSNHL). Materials and methods: We conducted a double-blind randomized ...

INTESTINE - GUT MICROBIOME

Effects of molecular hydrogen intervention on the gut microbiome in methamphetamine abusers with ...

Year Published: 2022

Methamphetamine (METH) is a potent and highly addictive psychostimulant and one of the most widely used illicit drugs, the abuse of which has become a severe public health problem worldwide. A growing amount of evidence has indicated potential connections between gut microbiota and mental disorders induced by METH and associations with neural and metabolic pathways. The present study aimed to ...

LUNG - CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

The effects of hydrogen treatment in a cigarette smoke solution-induced chronic obstructive ...

Year Published: 2022

Background: Molecular hydrogen, with its antioxidant and anti-inflammatory properties, may be suitable for the prevention and treatment of chronic obstructive pulmonary disease (COPD). This study aims to investigate the therapeutic efficacy of hydrogen-oxygen (H2/O2) treatment in cigarette smoke solution (CSS)-induced COPD-like injury in a female BALB/c mouse model. Methods: Thirty mice were ...

INTESTINE - EXCERCISE

Hydrogen improves exercise endurance in rats by promoting mitochondrial biogenesis

Year Published: 2022

Background: Previous studies have shown that hydrogen water has antioxidant and anti-inflammatory effects on exercise-induced fatigue; however, its molecular mechanism remains unclear. Methods: Adult male Sprague-Dawley rats were randomly divided into a pure water drinking group (NC) and a hydrogen water drinking group (HW) (n = 7), and 2-week treadmill training was used to establish a sports ...

INTESTINE - EXCERCISE

Effects of Intestinal Bacterial Hydrogen Gas Production on Muscle Recovery following Intense ...

Year Published: 2022

This study aimed to examine the effects of hydrogen gas (H2) produced by intestinal microbiota on participant conditioning to prevent intense exercise-induced damage. In this double-blind, randomized, crossover study, participants ingested H2-producing milk that induced intestinal bacterial H2 production or a placebo on the trial day, 4 h before performing an intense exercise at 75% maximal oxygen ...

BRAIN - SEPSIS

Effects of hydrogen-rich saline in neuroinflammation and mitochondrial dysfunction in rat model of ...

Year Published: 2022

Background: Sepsis-associated encephalopathy (SAE) is one of the most common types of sepsis-related organ dysfunction without overt central nervous system (CNS) infection. It is associated with higher mortality, low quality of life, and long-term neurological sequelae in suspected patients. At present there is no specific treatment for SAE rather than supportive therapy and judicious use of ...

WHOLE BODY - HYDROGEN BIOLOGY

Antioxidant effects of continuous intake of electrolyzed hydrogen water in healthy adults

Year Published: 2022

Chronic oxidative stress induces deterioration of health and a risk for the onset of various diseases. Previous clinical studies revealed that electrolyzed hydrogen water (EHW) is effective to reduce oxidative stress during hemodialysis in patients with chronic dialysis. In the present observational study, we investigated the antioxidant effects of a daily continuous intake of EHW in healthy ...

BRAIN - GUT MICROBIOME

Effect of molecular hydrogen treatment on Sepsis-Associated encephalopathy in mice based on gut ...

Year Published: 2022

Introduction: In our experiments, male wild-type mice were randomly divided into four groups: the sham, SAE, SAE + 2% hydrogen gas inhalation (H2), and SAE + hydrogen-rich water (HW) groups. The feces of the mice were collected for 16 S rDNA analysis 24 h after the models were established, and the serum and brain tissue of the mice were collected for nontargeted metabolomics analysis. Aim: ...

WHOLE BODY - EXCERCISE

Effects of Alkaline-Reduced Water on Exercise-Induced Oxidative Stress and Fatigue in Young Male ...

Year Published: 2022

Regular physical activity confers health benefits and improves the general quality of life. Recently, alkaline-reduced water (ARW) consumption has garnered increasing attention in the field of sports. ARW effectively inhibits the oxidative stress generated in cells during high-intensity exercises; however, whether it exerts similar effects during exhaustive exercises remains unknown. This study ...

INTESTINE - SURGERY/TRANSPLANTATION

Hydrogen gas and preservation of intestinal stem cells in mesenteric ischemia and reperfusion

Year Published: 2022

Background: Patients with mesenteric ischemia frequently suffer from bowel necrosis even after revascularization. Hydrogen gas has showed promising effects for ischemia-reperfusion injury by reducing reactive oxygen species in various animal and clinical studies. We examined intestinal tissue injury by ischemia and reperfusion under continuous initiation of 3% hydrogen gas. Aim: To clarify the ...

BONE - OSTEOARTHRITIS (OA)

Injectable spontaneous hydrogen-releasing hydrogel for long-lasting alleviation of osteoarthritis

Year Published: 2022

Excessive production of reactive oxygen species (ROS) amplifies pro-inflammatory pathways and exacerbates immune responses, and is a key factor in the progression of osteoarthritis (OA). Therapeutic hydrogen gas (H2) with antioxidative and anti-inflammatory effects, has a potential for OA alleviation, but the targeted delivery and sustained release of H2 are still challenging. Herein, we develop ...

KIDNEY - ACUTE KIDNEY INJURY

Effect of water diuresis with hydrogen saturation on the course of acute kidney damage during the ...

Year Published: 2022

Molecular hydrogen has the ability to penetrate cells, easily reach mitochondria, overcome body barriers, penetrate areas of ischemia, edema and inflammation, improve energy supply by supplying additional electrons and have antioxidant and anti-inflammatory effects by neutralizing highly reactive hydroxyl radical and peroxynitrite. In this experiment, we included 60 nonlinear male rats weighing ...

BRAIN - BRAIN INJURY

Pharmacokinetics of hydrogen administered intraperitoneally as hydrogen-rich saline and its effect ...

Year Published: 2022

Intraperitoneal administration of hydrogen (H2)-containing saline inhibited neuronal cell death in ischemic stroke in a number of animal models, but it is unknown whether H2 is absorbed from the abdominal cavity into the blood and reaches the brain. In this study, we investigated whether intraperitoneal administration of saline containing H2 inhibits neuronal cell death caused by cerebral ischemia ...

SPINE - NEUROPATHIC PAIN

Hydrogen-Rich Saline Attenuates Chronic Allodynia after Bone Fractures via Reducing Spinal ...

Year Published: 2022

Purpose: Neuroinflammation often initiates iron overload in the pathogenesis of neurological disorders. Chemokine-driven neuroinflammation is required for central sensitization and chronic allodynia following fractures, but specific molecular modulations are elusive. This present study explored whether hydrogen-rich saline, as one potent anti-inflammatory pharmaceutical, could alleviate ...

WHOLE BODY - EXCERCISE

Acute pre-exercise hydrogen rich water intake does not improve running performance at maximal ...

Year Published: 2022

Purpose: This study investigated the effects of acute, pre-exercise, hydrogen rich water (HRW) ingestion on running time to exhaustion at maximal aerobic speed in trained track and field runners. Methods: Twenty-four, male runners aged 17.5 3 1.8 years, with body mass index = 21.0 3 1.3 kg-m-2, and maximal oxygen uptake = 55.0 3 4.6 ml-kg-1-min-1 (mean 3 standard deviation) participated ...

WHOLE BODY - CANCER

Rational Design of Platinum-Bismuth Sulfide Schottky Heterostructure for Sonocatalysis-Mediated ...

Year Published: 2022

Conventional sonodynamic therapy (SDT) is unavoidably limited by the tumor microenvironment although many sonosensitizers have been developed to improve them to a certain extent. Given this, we propose a concept of sonocatalytic hydrogen evolution and define it as an oxygen-independent therapeutics. To demonstrate the feasibility of the concept, narrow-bandgap semiconductor bismuth sulfide (Bi2 S3 ...

WHOLE BODY - EXCERCISE

Fukuoka, Yoshiyuki

Year Published: 2021

We investigated effects of molecular hydrogen (H2) supplementation on acid-base status, pulmonary gas exchange responses, and local muscle oxygenation during incremental exercise. Eighteen healthy, trained subjects in a randomized, double-blind, crossover design received H2-rich calcium powder (HCP) (1500 mg/day, containing 2.544 Qg/day of H2) or H2-depleted placebo (1500 mg/day) for three ...

WHOLE BODY - EXCERCISE

Hydrogen Rich Water Consumption Positively Affects Muscle Performance, Lactate Response, and ...

Year Published: 2021

Hydrogen rich water consumption positively affects muscle performance, lactate response, and alleviates delayed onset of muscle soreness after resistance training. J Strength Cond Res XX(X): 000-000, 2021-Positive outcomes of hydrogen rich water (HRW) supplementation on endurance performance have been shown, but the effects of HRW in resistance training are unclear. The aim of this study was to ...

BONE - OSTEOGENESIS

Molecular hydrogen enhances osteogenesis in Danio rerio embryos

Year Published: 2021

Molecular hydrogen (H2) has been reported to have important biological effects on bone tissue in several in vitro and in vivo models. Danio rerio (zebrafish) embryo is a good model to study osteogenesis because its transparency, size and rapid development. In zebrafish embryo, hydrogen rich water (HRW) do not affect vitality or growth rate up to 15%. In addition, 7% HRW treatment enhances ...

BRAIN - SEPSIS

Hydrogen alleviated neuronal injury and neuroinflammation induced by microglial activation via the ...

Year Published: 2021

Objective: Sepsis-associated encephalopathy (SAE) is characterized by diffuse cerebral and central nervous system (CNS) dysfunction. Microglia play a vital role in protecting the brain from neuronal damage, which is closely related to inflammatory responses. The Nrf2 signaling pathway has an impact on microglial and neuronal injury. Here, we mainly explored the molecular mechanism by which H2 ...

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